Applying Back-Propagation Neural Network for Estimating the Slump of Concrete

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Abstract

This paper proposes the back-propagation neural network (BPN) and applies it to estimate the slump of high-performance concrete (HPC). It is known that HPC is a highly complex material whose behaviour is difficult to model, especially for slump. To estimate the slump, it is a nonlinear function of the content of all concrete ingredients, including cement, fly ash, blast furnace slag, water, superplasticizer, and coarse and fine aggregate. Therefore, slump estimation is set as a function of the content of these seven concrete ingredients and additional four important ratios. The results show that BPN obtains a more accurate mathematical equation through learning procedures which outperforms the traditional multiple linear regression analysis (RA), with lower estimating errors for predicting the HPC slump.

Keyword：Back-Propagation Neural Network (BPN), Slump, High-performance concrete, Regression analysis.